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## Application of kinesiology taping for pain management in oncologic patients

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### Abstract

Rehabilitation of patients with a diagnosed cancer poses a major challenge for physiotherapists (PT) due to the limited number of methods which may be used on every stage of cancer treatment (including convalescence). Kinesiology Taping (KT) is one of the few available options that enable pain and oedema reduction. Limited number of studies with significantly varied study methods makes it difficult to draw clear conclusions on the legitimacy of KT use. Aim of the review was to analyse available studies on the KT use in pain management and associated discomfort reported by cancer patients. Six papers met the criteria for the review and were included in the detailed pooled analysis (2 clinical studies and 4 case studies). Analysis emphasized papers describing analgesic effect of KT. On the basis of available studies, it proved to be beneficial for oncology patients (breast cancer, lung cancer, multiple myeloma). Additionally, studies reported an increased ability to carry out daily activities, decreased 'psychological suffering' and lower fatigue which directly resulted in the improvement of the quality of life (QoL) – a main goal of palliative care. The number of studies that evaluate the effectiveness of KT in pain reduction in oncology patients is scarce. Since KT has minor adverse effects it is recommended to be used as an adjunct analgesic therapy. Review supports the effectiveness of KT for pain management in oncologic patients. In order to confirm the efficacy of KT use in cancer patients, a greater number of randomized clinical trials, covering larger study groups, is required with special emphasis on malignant neoplasms.

**Keywords:** kinesiotaping, pain, cancer, application

### Introduction

Treatment of oncologic patients poses a major challenge for physiotherapists. The number of available physiotherapeutic methods is limited during all the treatment phases as well as after its completion while the convalescence stage takes place. Extreme exhaustion, as a result of radio – and chemotherapy, adds an

additional burden for the patients [1]. Due to the aging of the society, despite the drop in epidemiology for some types of tumours (i.e. stomach – both sex, lung in men or cervical cancer in women) they remain a second main cause of death (after cardiovascular diseases) in Poland [2,3]. In the last few years there has been an increased discourse on the use of Kinesiology Taping (KT) in oncology patients as an adjunct therapy. KT has



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been used for treating specific cancer-related symptoms such as pain and lymphatic oedema. By stabilizing the muscle tone, improving the blood and lymph flow as well as decreasing the pain, KT may be used safely with a minimum amount of potential adverse effects (excluding general contraindications similar for all patients) [4–6]. Additional doubts were raised in terms of malignant types of tumour [7]. Despite the fact that KT is commonly used in clinical practice – the evidence for its actual efficiency is scarce – especially in oncology. The aim of this paper was to analyse existing studies for the use of KT in the treatment of pain in oncology patients.

## Material and methods

In order to prepare this paper authors have searched and analysed, from March to July 2019, papers in the following databases: Pubmed, Google Scholar, PEDro and EMBASE. Search strategies included keywords such as: kinesiотaping, kinesiology taping, KT with terms like cancer and pain. Analysis included papers in English and in Polish with the exclusion of publications where only the abstract was available. Finally 6 papers met the criteria for this review – as they discuss the use of KT in order to reduce pain in patients with a diagnosed cancer (2 clinical studies and 4 clinical cases). Heterogeneity and different methodology of the papers significantly affected the result comparison.

### Cancer related pain

Approximately 50% of patients, within the oncology treatment, experience cancer-related pain. Patients with an advanced tumour (as defined by its invasiveness) suffer from pain in 50 to 70 % of cases [10]. Pain characteristic is strongly dependent on the location and type of tumour. It can be induced by the pressure of the tumour alone and/or its metastasis, treatment (diagnostic procedures, radio – and chemotherapy, surgery and others) or by an indirect mechanism (metabolic disorders, myofascial pain, infections). Radiotherapy as well as chemotherapy may cause pain in cancer patients, which can last long after the treatment completion [11]. Pain may not even be directly associated with the cancer itself but be more likely a result of a general exhaustion (i.e. chest pain, lumbar spine pain or a diabetic neuropathy) [12]. All of the above may significantly decrease patients functionality and negatively affect its mental status causing the decrease in the quality of life (QoL). As a result, majority of the guidelines, on healthcare for oncology patients, emphasizes the constant need for a supervision of pain level on every stage of the disease, stating that minimizing pain is one the

main goals for the therapy [13]. Papers included in the review treated on the problem of pain in patients with a diagnosed tumour at a different stages of the disease and/or therapy.

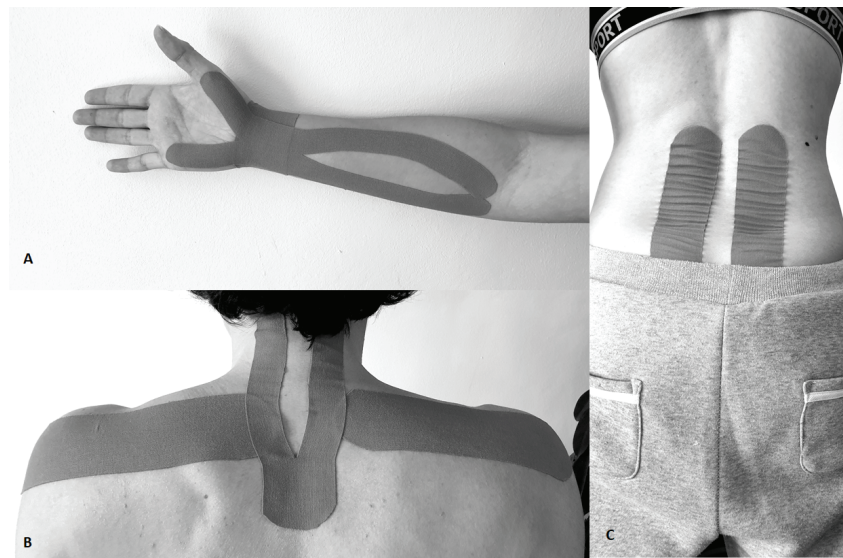
### Kinesiology taping in pain management

Pain is the most often reported symptom in medicine [14], it is also one the most popular causes for visiting a physiotherapist (PT) by a patient (as his/her decision of as a reference from a general practitioner). Patient under the care of PT is expecting an effective treatment results as soon as its possible. The use of a classical rehabilitation methods (kinesiotherapy, physical therapy e.g. electrotherapy) does not always allow to achieve expected, instant results. Furthermore, the efficiency of the above mentioned methods is proven by the studies classified as moderate or weak evidence, that usually refer to kinesiotherapy over physical therapy [15]. There is a number of scientific studies regarding the efficiency of KT in pain reduction [16–21]. At the same time it is impossible to confirm its efficiency in metanalysis due to small study groups as well as to the heterogeneity of those studies [8,22,23].

Our clinical experience using KT as well as scientific literature confirms that the majority of patients (app. 60–70%) report a reduction or a complete relief in pain sensation following recent KT application (initial 48 h) [8,21,24–26]. An important benefit of KT is the lack of additional effort/involvement from the patient (i.e. participating in daily exercises) – once applied, the tapes ‘work’ 24h for the whole time they stay applied on a patient (usually 3–5 days) [26].

### Cancer related pain and kinesiology taping

A dramatic increase in incidence of breast cancer has been observed in Poland for several decades [3]. Due to increasingly efficient therapies, including surgical treatment, radiotherapy, chemotherapy and hormonal therapy, an increase in the survival rates of such patients is observed. In some cases, these therapeutic solutions may result in greater intensity of pain sensations. Conejo et al. undertook a study to assess the efficiency of Neuromuscular Taping (NMT) in a group of 40 women treated with aromatase inhibitors (AIs) which allowed them to reduce the risk of a cancer recurrence [27]. Studies show that AIs are 30% more efficient in reducing the risk of a recurrence compared to tamoxifen (TMX). Common side effects for the use of AIs include joints pain (arthralgia) – reported by 50% of patients. As a result, 1/3 of those women refused to continue the AIs therapy. In order to solve the problem authors used KT to minimize the pain sensation in their study group. All applications were prepared by the same, experienced PT. Depending on the pain



**Fig. 1.** Applications used in the study group by Conejo et al. recreated by the authors on a model: A. Application for a carpal tunnel syndrome; B. Application for the pain in cervical spine and neck; C. Application for lumbar spine

location there were 4 possible application sites (carpal tunnel syndrome, lumbar and cervical spine if morning stiffness, lumbar spine alone, cervical spine and neck). Changes in VAS (Visual Analog Scale) and QoL were observed following the NMT application in the study group (unlike in the placebo group) [27]. According to the authors NMT allowed to reduce subjective pain sensation (6.1 to 4.9 in VAS,  $p = 0.009$ ), therefore it may minimize the AIs dropout rate [27]. Application used in the study group by authors are presented in figure 1.

Imperatori et al. [28] was the next major study in the analysis, assessing the use of KT in pain management in oncology patients, with 117 patients following lobectomy (surgical procedure involving partial lung resection). Use of KT was planned as an adjunct

therapy following standard pain management procedure for surgery-related pain. Standard postoperative analgesia was administered in both groups (study and control). There was however a difference in KT application method and the types of tapes that have been used (usual nonelastic tapes as the placebo). KT application in the study group included 3 locations: chest pain trigger point (space correction 25–50% tension), deltoid muscle (functional technique, 15% tension) and diaphragm (functional technique, 15% tension)(fig. 2). Small, statistically significant differences in chest pain (1 in VAS) were observed between the groups after 5 and 8 day follow-up. Additionally follow-up after 30 days showed a reduction on the postoperative pain occurrence, as it was reported significantly less frequently



**Fig. 2.** Applications used in the study group by Imperatori et al. recreated by the authors on a model: A. Application used for the trigger point and the diaphragm; B. Application for the deltoid muscle

in the KT group in comparison to the placebo group (7 vs. 24%,  $p = 0.03$ ) [28].

Improvement of breathlessness in oncology patients was presented in case studies published by Banerjee et al. [29,30]. By reducing the tumour related pain (up to 85%) patient's breathing comfort has improved significantly. In both cases analysed by authors the pain was a derivative of a breast cancer [29,30]. First case study was associated with a fractured vertebrae ( $Th_8$ ) a result of a metastasis during the relapse phase of the breast cancer. Patient described the pain as a severe 'tearing' and 'searing' sensation accompanied by stiffness in the left side trapezius region – symptoms attributed to the consequential effects of the surgery and poor posture as a result of patient's hypervigilance to pain. The patient was treated with 3 strips of tape (length ~20 cm, 20% tension, fascial technique) applied directly over the painful site. Authors observed a major reduction in pain and sensations described as 'searing/tearing' (50 and 85% respectively). Patient was treated with KT for a period of 3 months (including breaks), during which she kept reporting improved stability and control of the left shoulder girdle area, that was achieved [29].

Second case study described by Banerjee et al. referred to a patient under the palliative care [30]. The treatment was aimed to improve the patients quality of life. As a result of previous intensive trainings (physical activity of an athlete), chemotherapy and vertebral compression fractures, patient was suffering from breathlessness and pain located in the chest, pelvis and sacrum. Palpation study revealed partially enlarged liver (pressing the diaphragm) as well as increased tone of the paraspinal muscles. Few KT tapes were used, partially cut into smaller "fans" with mutual anchor (fan type tape with 10–20% tension). A lymphatic technique was directly applied onto lower part of chest, rib cage, diaphragm, and abdomen. Similar to the previously mentioned case study, therapy lasted for a vast period of time (last consult took place 4 months after the first). The patient's examination revealed a significant decrease in pain, improvement in breathing and quality of life (ability to perform the activities of daily living for longer periods of time) during the course of KT treatment – all of which was confirmed by the patient herself and her relatives [30].

Palliative healthcare combined with the functional capabilities of terminally ill patient makes physiotherapy a crucial part of the treatment plan. Pyszora et al. described 3 case studies treated with soft tissue therapy and KT during their palliative treatment [32]. In all cases the patient was an elderly person with cancer: 80-year-old men with lung cancer, 62-year-old with multiple myeloma and 77-year-old with a breast cancer. In every patient different forms of KT application were used i.e.

for trigger points, intestines, lymphatic and fascial techniques in order to reduce painful oedema as well as other techniques from soft tissue including trigger points and myofascial release. Authors were convinced about the appropriateness of their approach, as it was proven by the improvement in the QoL, increased ability to carry out daily activities and the decrease of psychological distress observed in patients. Methodology used in the paper (3 different case studies) does not allow to differentiate how much of the final effect was achieved due to KT or soft tissue therapy [31]. Painful oedema and a failure to deliver standard lymphoedema treatment (manual drainage, multilayer bandaging) was a reason to use KT in a different case with a diagnosed tumour. In that case study Pyszora et al. analysed 56-year-old patient diagnosed with a malignant pancreatic cancer. Although visceral pain had been successfully treated with medications (morphine and buprenorphin), due to painful oedema (lower limbs) especially in the calf area it was not possible to use standard treatment (drainage and bandage). An alternative approach involved a lateral, lymphatic KT application on the lower leg starting from the lateral side. Tapes were used on both legs, each with 3 "fans" (on lateral, medial and posterior aspect of the lower leg) with 15–25% tension. Three days later, after removing the application, significant reduction of the oedema, pain and the feeling of "heaviness" in the leg were found in the subject. The therapy had an ongoing status at the moment when paper was published – with KT being applied every 3–5 days with 24h break between the cycles [32].

Detailed description of the analysed papers is included in table 1.

### Author's experience – case study

Patient ZP made an appointment with the PT because of a severely painful shoulder and scapula area on the right side. In the patient's medical history there was a notification of a lung cancer treatment (4<sup>th</sup> year of the remission) that included surgery and chemotherapy. Surgical treatment involved the removal of two lobes of the right lung by posterolateral thoracotomy. Additionally the patient was using an elbow crutch, as a result of a left hip replacement (10 years ago). Comorbidities reported by the patient included hypertension and osteoporosis. ZP reported she was under a continuous care of her oncologist and internal medicine specialist. During the physical examination, PT noticed a painful restriction in the range of motion (ROM) for the shoulder joint, most likely caused by a scar tissue after the thoracotomy. Pain was increased by the use of the crutch, that was not adapted to the patient's height. For the period of 6 consultations (2 weeks) the therapy was focused on the treatment of scar tissue with the use of



**Tab. 1.** Summary of the studies included in the analysis after reviewing the available literature

Study	Study type	Study group	Problem description	Intervention	Effects of the intervention	p
Conejo et al. [27]	Randomised controlled trial with a placebo group	Group: 40 W <sup>1</sup> Age: 50–82 (av. age 66.3 y) Diagnosis: breast cancer during the AIs therapy	Pain in the carpal tunnel	Application ( <i>CureTape, Fysiotape BV Netherlands</i> ): – X shape application, middle crossing point on the palmar wrist area; short anchors on the little finger hypothenar region and thenar eminence of the thumb; after elbow extension forearm supination and hand dorsiflexion – tape applied with the functional strips along the muscle and to the medial epicondyle of the humerus – I shape application, wrist in a neutral position, base of the application without tension, anchored on the dorsal side of the ulna, 50% tension.	After 5 week intervention authors observed an improvement in the overall health status (67.5 vs 76.7 global health status/QoL in the study group) reduction in pain (6.1 vs 4.9 in VAS in the study group and 29.16 vs 19.99 on the questionnaire) and decrease in fatigue from 26.6 to 21.6.	Global health status/QoL (p = 0.005)  Pain: – VAS (p = 0.009) – questionnaire (p = 0.04)  Fatigue (p = 0.01)
				Application ( <i>CureTape, Fysiotape BV Netherlands</i> ): – two I strips, with a base on the sacrum (S <sub>1</sub> ), patient with a flexed spine, paraspinal application placed paravertebrally along the iliocostalis muscle on both sides of the spine, in the direction of the cranium, no tension.		
			Pain and morning stiffness in the L-S spine	Application ( <i>CureTape, Fysiotape BV Netherlands</i> ): – Y shape application, patient with a mild cervical flexion, base of the tape at the upper Th spine (Th <sub>1</sub> -Th <sub>2</sub> ), strips applied toward cranial on both sides of the C spine, no tension – two I shape tapes (one a side), base from the head of the humerus, upper limb adducted, application on supraspinatus muscle, end at the medial edge of scapula, no tension.		
Imperiatori et al. [28]	Prospective randomised controlled trial with a placebo group	Group: 92 W <sup>1</sup> +M <sup>2</sup> Age: 18–85 y Diagnosis: lung cancer	Surgery related chest pain after a lobectomy	Application ( <i>Kinesio Tex Gold</i> ): – ‘Star’ shape application for the chest trigger point with 25–50% tension in the middle of the tape, – Y shape application on the deltoid muscle, base without tension at the deltoid tuberosity, strips with 15% tension along the muscle medial and lateral side – I shape application placed horizontally on the lower anterior chest along the diaphragm.	After the application patients reported: less frequent chest pain, reduction in pain intensity (1.1 in VAS) after 5 <sup>th</sup> and 8 <sup>th</sup> day from the surgery and less frequent chest pain on postoperative 30 <sup>th</sup> day (7 vs 24%).	Pain: – 5 day (p < 0.01) – 8 day (p < 0.05) – 30 day (p = 0.03)

Banerjee et al. [29]	Case study	Woman Age: 46 y Diagnosis: breast cancer with metastasis	Pain sensation after a spine surgery (Th <sub>8</sub> fracture); “tearing”, “searing”, accompanied by stiffness in the mid-trapezius region	Application ( <i>Tiger K Tape</i> ): – three I shape tapes with a 20% tension applied directly over the painful region from superior to inferior direction over the shoulder girdle and upper back, patient in a sitting position with a mild cervicothoracic flexion, arm hanging forward.	After 7 days from the application – 50% decrease in pain intensity and reduced tearing and searing sensations by 85%. Pain episodes were weaker and less frequent.
		Woman Age: early 40s Diagnosis: breast cancer with metastasis (bone, liver, lungs)	Chest pain accompanied by breathlessness, oedema, vertebral compression fractures in C and Th spine. Pain located in the L-S spine region Severe nausea, abdominal bloating and oedema in the liver region.	Lymphatic application: – tape with thin stripes (fans), application placed on a chest during the inspiration phase of the breathing cycle with 10-20% tension, base without tension in the vicinity of axillary lymph nodes. Analgesic application: – Y shape strip along the spine applied cranially with a base on the sacrum (S <sub>1</sub> ). Lymphatic application: – tape with thin stripes (fans) over the patient liver region with 10-20% tension.	Reduction of chest pain, no noticeable change in pain intensity in lower back region. Decrease in breathlessness from moderate to mild. Smaller nausea, facilitated consumption of liquids and food.
Pyszora et al. [31]	Case studies	Man Age: 80 y Diagnosis: lung cancer	Pain in the C spine and shoulder area. Most intense in the high cervical region of the paraspinal muscles, the suprascapular and acromion area on the right side of the body.	Application was preceded by – INIT (integrated neuromuscular inhibition technique) a soft tissue technique used on a trapezius muscle trigger point. KT was used as a supporting technique in a form of a “star” shaped application placed directly over the painful myofascial trigger point of the trapezius muscle.  In order to reduce muscle tension the myofascial release technique (MFR) was used on of the rectus abdominis, pyramidalis, abdominal obliques and transversus abdominis. Four Y shape tapes were used in a form of spiral application for intestines aimed to minimize the constipation problem and to release the tightness in the abdomen. Additionally the family was instructed to perform abdomen massages 2x/day.	A reduction in pain was observed resulting in increased patient activity  Decrease in muscle tone of the abdomen muscles following the reduction of abdominal pain. Increased ability to carry out daily activities by the patient.
		Woman Age: 62 y Diagnosis: multiple myeloma	Bone pain, located mostly in the spine as a result of vertebral fractures (Th <sub>4,5</sub> ), abdomen pain as a result of constipation.	Application: – fascial – with the use of two Y shape tapes on a knee joint in order to reduce skin tension and muscle tone, – lymphatic over the knee joint with thin stripes (fans). Additionally a post-isometric relaxation was performed for the muscles surrounding ankle joint.	Oedema and pain reduction resulting in the improvement of patients locomotory skills as well as increased activity and independence in daily life (simple housework).
		Woman Age: 77 y Diagnosis: breast cancer	Severe pain sensation in the knee and ankle joints after tibial fracture stabilizing surgery as a result of a metastasis.		

soft tissue techniques, KT (K-Active tape, 5 cm) and gait re-education with cane instead of a crutch. Soft tissue therapy included scar mobilization, deep tissue and functional massage. KT treatment involved an application specifically designed for the scar and a second one for the deltoid muscle. Scar application consisted of a I shape tape that covered the fully extended scar (app. 30 cm) without any tension. Additionally for the most painful site – an application with 2 strips of tape was used ( $8 \times 2.5$  cm) with a ~50% tension, crossing under the angle of  $45^\circ$  – a total of 3 crossing sets were used (fig. 3). For the period of 3 weeks the KT scar application has been used 3 times and the deltoid application twice. Applications were used by the patient for an average of 5 days after which she had a 2-day break. After the therapy the patient experienced a noticeable difference in pain and quality of life. Patient started limiting the painkillers (tramadol) in the first and second week following a complete discontinuation in the third week. Active ROM noticeably increased which allowed ZP for a greater independence in carrying daily activities e.g. dressing and bathing.

#### Is analgesic effect of KT a placebo?

A common treatment effect of KT reported by oncologic patients is a decrease in the subjective pain sensing effect described by them and scientists as a reduced “psychological suffering”. Since its beginning KT has been raising a lot of controversies regarding its



**Fig. 3.** Application used by the author for a thoracotomy related scar observed in the ZP patient

operating mechanisms, as in many cases it was being associated with placebo effect [9,33]. By activating natural substances and analgesic mechanisms (opioid and non-opioid), placebo is believed to have a vital meaning in the therapy of cancer patients. Efficiency of this effect is also depended on other things like the treatment form (including touch), power of suggestion and patient susceptibility [34]. Additional things which may influence the patient's assessment include factors like tape colour or his awareness while the tape is being applied [35]. Studies that compare the efficiency of KT and placebo are not providing a straight forward answer if the treatment effect and pain reduction are solely associated with the placebo. Halski et al. studied the analgesic effect on myofascial trigger points in 3 groups of patients divided by the use of cross taping (CT), kinesiology taping (KT) and placebo application (non-elastic tape). All analysed groups, after tape application, presented a statistically significant pain reduction, most noticeable (2.8 in VAS) in the KT group. The effect was less visible during the control measurement (follow-up after 24h): 1.6 in VAS. Simultaneously in other groups (CT and placebo) VAS has decreased in comparison to the preintervention measurement (2.1 and 1.5 respectively) [36]. Limited options for the use of placebo (patient is aware of the moment of application and it is impossible to perform a double blind study) hinders the conduct of randomized controlled trials, which are vital to assess the advantage of KT over placebo.

Since the topic of placebo use in the therapy of cancer patients still raises a lot of controversies – there is a need for further discussion [37,38]. At the same time, recent study presented potential benefits of KT for the patients such as reduced cancer-related fatigue and improved quality of life [32,39]. As it was mentioned before, KT has a relatively small number of side effects (few contraindications). Additionally patients often appreciate its analgesic effect as observed in several bigger clinical trials and in case studies presented in this review [27-32]. It is our opinion that currently available scientific proof speak in favour of the KT use in oncologic patients in order to reduce cancer-related pain regardless of its origin. Furthermore authors believe that there is a need of larger randomized controlled studies to confirm the above mentioned conclusion as well as to prove without any doubts the effectiveness of KT operating mechanism and its safety for patients with malignant tumours [29].

#### Duration of KT application and patient with a diagnosed tumour

While considering the use of KT in oncologic patients – it should also be discussed how long particular applications lasted in various studies. During different

KT courses, participants are often warned about the risk of muscles ‘getting used to’ a relief brought by the tapes – often comparing this effect to the one observed in the long-term use of an orthopaedic corset. Despite this, in the majority of described case studies and clinical trials KT has been used longer than it’s usually suggested (3–7 days). This may be explained by the fact that improving QoL is a relevant treatment effect to cancer patients, far more important than possible ‘subsequent’ muscle damage – a result of ‘the getting used to’ mechanism observed while the muscles work in ‘relieved’ conditions. Similar results, have been reported in terms of orthopaedic corsets as according to the recent studies the above mentioned mechanism is less harmful than it was believed to be [40,41]. It is important to find a right moment to use KT, depending on the appearance of pain sensation. On the basis of our personal clinical experience as well as the available literature we believe that the potential KT therapeutic effect is greater the sooner the painful site is applied with tapes. Taking into account the specificity and variety of tumours – it is impossible to provide a clear answer when this therapy would be most beneficial for the patient while being least harmful at the same time. Additionally, immediate application does not always guarantee the durability of the analgesic effect [42].

## Summary

Summing up the results of many scientific papers, it is worth emphasizing that properly implemented physiotherapy helps to reduce the ailments and complications associated with cancer [26]. The importance of physiotherapy in clinical practice has also been emphasized by the fact that physical activity has been included in the European Code Against Cancer [43].

The amount of studies which assess the pain reducing effect of KT in a cancer patients is limited, however analysed literature confirms the effectiveness of KT in pain reduction in oncology patients. Authors of those studies emphasize that KT should not be a single intervention, but should be an adjunct to other therapies (e.g. manual therapy, soft tissue therapy or exercises) [8,44]. Heterogeneity of available KT studies along with the previously mentioned problems with blinding the study significantly impede the ability to confirm KT effectiveness over other analgesic methods. At the same time the vast majority of patients respond well to therapy with tapes. Seeing the tapes being applied by a PT, having them kept for 24h/day on the skin, gives the patient an additional support, constantly reminding about the therapy.

## Conclusions

1. Due to the low invasiveness of the KT method, it is advisable to use it as an adjunct therapy with other forms of analgesic intervention.
2. A greater number of randomized clinical trials are needed to confirm the analgesic efficacy and safety of KT in the group of cancer patients, with particular emphasis on malignant tumours.

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## Conflicts of interest

The authors declare no conflict of interest.

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